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Optimizing Synchronization Stability of the Kuramoto Model in Complex Networks and Power Grids[1] BO LI, K. Y. MICHAEL WONG, Hong Kong Univ of Sci Tech — Maintaining the stability of synchronization state is crucial for the functioning of many natural and artificial systems. For the Kuramoto model on general weighted networks, the synchronization stability, measured by the dominant Lyapunov exponent at the steady state, is shown to have intricate and nonlinear dependence on the network topology and the dynamical parameters. Specifically, the dominant Lyapunov exponent corresponds to the algebraic connectivity of a meta-graph whose edge weight depends nonlinearly on the steady states. In this study, we utilize the cut-set space (DC) approximation to estimate the nonlinear steady state and simplify the calculation of the stability measure, based on which we further derive efficient algorithms to optimize the synchronization stability. The properties of the optimized networks and application in power grid stability are also discussed.

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